

## 20.9: Writing Quadratics with Given Conditions

### Sum and Product of the roots

if  $ax^2 + bx + c = 0$  ; then

- Sum of roots =  $\frac{-b}{a}$   
( $r_1 + r_2$ )

- Product of roots =  $\frac{c}{a}$   
( $r_1 \times r_2$ )

**$\ell x$ :** For the quadratic equation  $2x^2 + 5x + 8 = 0$ , find:  
**a.** the sum of its roots      **b.** the product of its roots

Writing a quadratic knowing its roots:

★ Every quadratic can be written as:

$$x^2 - (S)x + (P) = 0$$

Where  $S = \text{Sum of roots; } r_1 + r_2$

$P = \text{Product of roots; } r_1 \times r_2$

Ex: write the quadratic equation  
with roots 2 and -5.

★ Complex and irrational roots  
come in conjugate pairs.

if  $1+2i$  is a root then  $1-2i$  is also

$$2-3\sqrt{5}$$

$$2+3\sqrt{5}$$

Ex: Write a quadratic equation with  $2-3i$  as one of its roots.

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## EXERCISES WITH OPEN-RESPONSE PROBLEMS

**Pg 960**  
**3-39 ( $\div 3$ )**

In 1-12, for each quadratic equation, find: **a.** the sum of its roots **b.** the product of its roots

**1.**  $x^2 - 2x - 15 = 0$       **2.**  $x^2 + 9x + 5 = 0$       **3.**  $2x^2 - 7x + 3 = 0$       **4.**  $4x^2 + x - 3 = 0$   
**5.**  $x^2 + 6x = 16$       **6.**  $3x^2 + 9x = 2$       **7.**  $2x^2 = 3x - 6$       **8.**  $x^2 + 9 = 0$   
**9.**  $4x^2 - 8x = 0$       **10.**  $2m^2 + 2 = 5m$       **11.**  $5k - 10 = 2k^2$       **12.**  $y^2 + 2y = 2$

In 13-18, in each case, write a quadratic equation whose roots have the indicated sum and product.

**13.** sum = 4, product = 3      **14.** sum = 16, product = -80  
**15.** sum = -3, product = -10      **16.** sum = -6, product = 8  
**17.**  $r_1 + r_2 = 8, r_1 r_2 = 25$       **18.**  $r_1 + r_2 = -\frac{5}{2}, r_1 r_2 = 1$

In 19-39, in each case, write a quadratic equation that has the given roots.

**19.** -3, 5      **20.** 2, 10      **21.** -4, -6      **22.** -8, 8  
**23.** 7, 0      **24.**  $\sqrt{3}, -\sqrt{3}$       **25.**  $\frac{1}{2}, 4$       **26.**  $-2, \frac{3}{2}$   
**27.**  $-\frac{1}{3}, -\frac{2}{3}$       **28.**  $i, -i$       **29.**  $4i, -4i$       **30.**  $2 + i, 2 - i$   
**31.**  $6 - i, 6 + i$       **32.**  $2 + \sqrt{3}, 2 - \sqrt{3}$       **33.**  $1 - \sqrt{7}, 1 + \sqrt{7}$   
**34.**  $5 + 3i, 5 - 3i$       **35.**  $-4 + 5i, -4 - 5i$       **36.**  $7 + i, 7 - i$   
**37.**  $-2 + i\sqrt{5}, -2 - i\sqrt{5}$       **38.**  $6 + 3i\sqrt{2}, 6 - 3i\sqrt{2}$       **39.**  $4 + 2i\sqrt{3}, 4 - 2i\sqrt{3}$

**\*  $x^2 - (S)x + (P) = 0$**

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